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COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS

Sub-Committee of Experts on the Transport of Dangerous Goods
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agenda item 3(b))

PACKAGINGS AND IBCs

Editorial revision of Chapter 4.1

Transmitted by the Expert from the United Kingdom

1. Editorial Revision of Chapter 4.1

In the 10th Edition of the Recommendations a number of paragraphs were moved from Chapter 9 and Chapter 16 into Chapter 4.1. During a review of the new text, duplication of certain provisions for packagings and IBCs was recognised. At its Thirteenth Session in July 1997, the Sub-Committee also adopted new provisions for large packagings (ST/SG/AC.10/C.3/1997/35/ Rev.1), which has added to this problem.

This duplication is unnecessary and confusing. Packagings, including IBCs and large packagings, should be used under the same general provisions.

The Expert from the United Kingdom therefore proposes an editorial revision to Chapter 4.1.1 to combine the common text. This was first submitted to the Fourteenth Session in December 1997 as document ST/SG/AC.10/C.3/1997/62, but, in the light of comments made, that proposal was withdrawn (report ST/SG/AC.10/C.3/28, paragraph 76). This revised version takes account of written comments received since December.

In addition, in the table of examples of required marked test pressures, "Note 2" would be deleted and Notes 3 and 4 renumbered. The table was taken from the ICAO Technical Instructions. Note 2 is incomplete but in fact only deals with specific conditions for air transport. It is not intended to include this Note in Amendment 30-98 to the IMDG Code.

2 Consequential Changes

1 4.1.1.14 requires packagings to be manufactured under a quality assurance programme. The equivalent provision for IBCs will be found in 6.5.1.6.1 and that for large packagings is in 6.6.1.2. As quality assurance is not a packing user responsibility and to align with the other chapters, it is proposed to move 4.1.1.14 to 6.1.1.4.

2 There are cross references in 6.5 which need to be altered to reflect the new style.

3 Some minor editorial additions result from the adoption of provisions for large packagings in July 1997.

Proposal

Chapter 4.1 Use of Packagings, Intermediate Bulk Containers (IBCs) and Large Packagings

Note 1: Packing groups

Dangerous goods of all classes other than Classes l, 2, and 7, divisions 5.2 and 6.2 and the self-reactive substances of division 4.1 have for packing purposes been assigned to three packing groups in accordance with the degree of danger they present, i.e.

Packing Group I: substances presenting high danger
Packing Group II: substances presenting medium danger
Packing Group III: substances presenting low danger

[to align with 2.0.1.3]

The packing group to which a substance is assigned is indicated in the Dangerous Goods List in Chapter 3.2.

Note 2: *Explosives, self-reactive substances and organic perioxides*

Unless specific provision to the contrary is made in these Regulations, the packagings, including IBCs or large packagings, used for goods of Class 1, self-reactive substances of Division 4.1 and organic peroxides of Division 5.2 shall comply with the provisions for the medium danger group (Packing Group II).

4.1.1 General provisions for the packing of dangerous goods, other than goods of Classes 2 or 7 or Division 6.2, in packagings, including IBCs or large packagings.

4.1.1.1 Dangerous goods shall be packed in good quality packagings, including IBCs or large packagings, which shall be strong enough to withstand the shocks and loadings normally encountered during transport, including trans-shipment between transport units and/or warehouses as well as any removal from a pallet or overpack for subsequent manual or mechanical handling. Packagings, including IBCs and large packagings, shall be constructed and closed so as to prevent any loss of contents when prepared for transport which might be caused under normal conditions of transport, by vibration, or by changes in temperature, humidity or pressure (resulting from altitude, for example). No dangerous residue shall adhere to the outside of packages, IBCs or large packagings during transport. These provisions apply to reused, reconditioned or remanufactured packagings, including IBCs or large packagings, as appropriate.
(Ref. Doc. ST/SG/AC.10/C.3/1997/61)

[i.e. include 4.1.2.4]

4.1.1.2 Parts of packagings, including IBCs or large packagings, which are in direct contact with dangerous goods

(a) shall not be affected or significantly weakened by those dangerous goods, and

(b) shall not cause a dangerous effect e.g. catalysing a reaction or reacting with the dangerous goods.

Where necessary, they shall be provided with a suitable inner coating or treatment.

4.1.1.3 Unless provided elsewhere in these Regulations, each packaging, including IBCs or large packagings - except inner packagings of combination packagings - shall conform to a design type successfully tested in accordance with the requirements of 6.1.5, 6.5.4 or 6.6.5, respectively.

4.1.1.4 When filling packagings, including IBCs or large packagings, with liquids, sufficient ullage (outage) shall be left to ensure that neither leakage nor permanent distortion of the packaging occurs as a result of an expansion of the liquid caused by temperatures likely to occur during transport. Unless specific requirements are prescribed in national or international rules, agreements or recommendations, liquids shall not completely fill a packaging at a temperature of 55 ∠C. However sufficient ullage shall be left in an IBC to ensure that at the mean bulk temperature of 50°C it is not filled to more than 98% of its water capacity.

[i.e. include 4.1.2.2.]

4.1.1.4.1 For air transport, packagings intended to contain liquids shall also be capable of withstanding a pressure differential without leakage as specified in the international regulations for air transport.

4.1.1.5 Inner packagings shall be packed in an outer packaging in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the outer packaging. Inner packagings that are liable to break or be punctured easily, such as those made of glass, porcelain or stoneware or of certain plastics materials, etc., shall be secured in outer packagings with suitable cushioning material. Any leakage of the contents shall not substantially impair the protective properties of the cushioning material or of the outer packaging.

4.1.1.6 Dangerous goods shall not be packed together in the same outer packaging, or in large packagings, with dangerous or other goods if they react dangerously with each other and cause:

(a) combustion and/or evolution of considerable heat;

(b) evolution of flammable, toxic or asphyxiant gases;

(c) the formation of corrosive substances; or

(d) the formation of unstable substances.

4.1.1.7 The closures of packagings containing wetted or diluted substances shall be such that the percentage of liquid (water, solvent or phlegmatizer) does not fall below the prescribed limits during transport.

4.1.1.7.1 Where two or more closure systems are fitted in series on an IBC, that nearest to the substance being carried shall be closed first.

[i.e include 4.1.2.3]

4.1.1.8 1/ Where pressure may develop in a package by the emission of gas from the contents (as a result of temperature increase or other cause), the packaging may be fitted with a vent, provided that the gas emitted will not cause danger on account of its toxicity, its flammability, the quantity released, etc. The vent shall be so designed that, when the packaging is in the attitude in which it is intended to be transported, leakages of liquid and the penetration of foreign matter are prevented under normal conditions of transport. Venting of the package is not permitted for air transport.

4.1.1.9 New, remanufactured or reused packagings, including IBCs or large packagings, or reconditioned packagings or repaired IBCs shall be capable of passing the tests prescribed in 6.1.5, 6.5.4 and 6.6.5, respectively. Before being filled and handed over for transport, every packaging, including IBCs or large packagings, shall be inspected to ensure that it is free from corrosion, contamination or other damage and every IBC shall be inspected with regard to the proper functioning of any service equipment. Any packaging, including IBCs or large packagings, which shows signs of reduced strength as compared with the approved design type shall no longer be used or shall be so reconditioned, or repaired, that it is able to withstand the design type tests.

[i.e. include 4.1.2.1].

4.1.1.10 Liquids shall be filled only into packagings, including IBCs, which have an appropriate resistance to the internal pressure that may develop under normal conditions of transport. Packagings or IBCs marked with the hydraulic test pressure prescribed in 6.1.3.1(d) and 6.5.2.2.1, respectively shall be filled only with a liquid having a vapour pressure:

(a) such that the total gauge pressure in the packaging (i.e. the vapour pressure of the filling substance plus the partial pressure of air or other inert gases, less 100 kPa) at 55°C, determined on the basis of a maximum degree of filling in accordance with 4.1.1.4 and a filling temperature of 15°C, will not exceed two thirds of the marked test pressure, or

(b) at 50°C less than four sevenths of the sum of the marked test pressure plus 100 kPa; or

(c) at 55°C less than two thirds of the sum of the marked test pressure plus 100 kPa.

[i.e. include 4.1.2.11.2].

Metal IBCs intended for the carriage of liquids shall not be used to carry liquids having a vapour pressure of more than 110kPa (1.1 bar) at 50°C or 130kPa (1.3 bar) at 55°C.

[i.e. include 6.5.3.1.1.(c): therefore 4.1.2.11.2 is unnecessary].

1/ *[Note: New first sentence added at the Sub-Committee in July 1997 (see - ST/SG/AC.10/C3/26 Add 2) is unnecessary as it is already covered in 4.1.1.10]*

EXAMPLES OF REQUIRED MARKED TEST PRESSURES FOR PACKAGINGS INCLUDING IBCs AND LARGE PACKAGINGS CALCULATED AS IN 4.1.1.10 (c)

UN No.	Name	Class	Packing Group	V_{p55} (kPa)	V_{p55} x 1.5 (kPa)	(V_{p55} x 1.5) minus 100 (kPa)	Required minimum test pressure gauge under 6.1.5.5.4.(c) (kPa)	Minimum test pressure (gauge) to be marked on the packaging (kPa)
2056	Tetrahydrofuran	3	II	70	105	5	100	100
2247	n-Decane	3	III	1.4	2.1	-97.9	100	100
1593	Dichloromethane	6.1	III	164	246	146	146	150
1155	Diethyl ether	3	I	100	299	199	199	250

Note 1: *For pure liquids the vapour pressure at 55 °C (V_{p55}) can often be obtained from scientific tables.*

Note 2: *The table refers to the use of 4.1.1.10 (c) only, which means that the marked test pressure shall exceed 1.5 times the vapour pressure at 55 °C less 100 kPa. When, for example, the test pressure for n-decane is determined according to 6.1.5.5.4 (a), the minimum marked test pressure may be lower.*

Note 3: *For diethyl ether the required minimum test pressure under 6.1.5.5.5 is 250 kPa.*

4.1.1.11 Empty packagings, including IBCs or large packagings, that have contained a dangerous substance shall be treated in the same manner as is required by these Regulations for a filled packaging, unless adequate measures have been taken to nullify any hazard.

[i.e. include 4.1.2.6]

4.1.1.12 2/ Every packaging, or IBC intended to contain liquids shall successfully undergo a suitable leakproofness test, and be capable of meeting the appropriate test level indicated in 6.1.5.4.3, or 6.5.4.7 for the various types of IBCs:

(a) before it is first used for transport;

(b) after remanufacturing or reconditioning of any packaging, before it is re-used for transport;

(c) after the repair of any IBC, before it is re-used for transport.

For this test the packaging, or IBC need not have its closures fitted. The inner receptacle of a composite packaging, or IBC may be tested without the outer packaging, provided the test results are not affected. This test is not necessary for inner packagings of combination packagings.

[i.e. include 4.1.2.9].

4.1.1.13 Packagings, including IBCs or large packagings, used for solids which may become liquid at temperatures likely to be encountered during transport shall also be capable of containing the substance in the liquid state.

[i.e include 4.1.2.8]

2/ *Although this provision was adopted for large packagings, it is in fact incorrect as there is no leak test for them in the new 6.6. 4.1.1.12 is only intended for single packagings. Large packagings are combination packagings.*

[4.1.1.14 3/ Packagings shall be manufactured and tested under a quality assurance programme which satisfies the competent authority in order to ensure that each manufactured packaging meets the requirements of this Chapter.]

4.1.1.15 4/ During transport, IBCs and large packagings, shall be securely fixed or packed into the transport unit so as to prevent lateral or longitudinal movement or impact and so as to provide adequate external support.

[i.e. reproduce 4.1.2.5]

4.1.1.16 5/ *Use of salvage packagings*

4.1.1.16.1 Damaged, defective or leaking packages, or dangerous goods that have spilled or leaked may be transported in salvage packagings mentioned in 6.1.5.1.11. This does not prevent the use of a bigger size packagings of appropriate type and performance level under the conditions of 4.1.1.16.2.

4.1.1.16.2 Appropriate measures shall be taken to prevent excessive movement of the damaged or leaking packages within a salvage packaging. When the salvage packaging contains liquids, sufficient inert absorbent material shall be added to eliminate the presence of free liquid.

4.1.2 Additional general provisions for the use of IBCs

4.1.2.1. to 4.1.1.9

4.1.2.2. to 4.1.1.4

4.1.2.3 to 4.1.1.7

4.1.2.4 to 4.1.1.1.

4.1.2.5 to 4.1.1.15 (or 7.1.1.X)

4.1.2.6 to 4.1.1.11

4.1.2.1 When IBCs are used for the transport of liquids, with a flash point of 60.5°C (closed cup) or lower, or of powders liable to dust explosion, measures shall be taken to prevent a dangerous electrostatic discharge.

[Formerly 4.1.2.7]

4.1.2.8 to 4.1.1.13

4.1.2.9 to 4.1.1.12

3/ *Move to a new 6.1.1.4 for packagings and 6.6.1 2 for large packagings since quality assurance concerns the manufacturer before the user and the equivalent for IBCs is already in 6.5.1.6.1. [Already noted for the reformatted IMDG Code.]*

4/ *Note: This paragraph should be moved to a new paragraph 7.1.1.X. In ST/SG/AC.10/C3/26 Add 2 the Secretary proposes that this paragraph is moved to Part 7.*

5/ *Note: If 4.1.1.14 is moved to 6.1.1.4 and 4.1.1.15 is moved to 7.1.1.X, existing 4.1.1.16 becomes 4.1.1.14.*

4.1.2.2 The periodic testing and inspection requirements for IBCs are provided in Chapter 6.5. An IBC shall not be filled and offered for transport after the date of expiry of the last periodic test required by 6.5.4.14.3, or the date of expiry of the last periodic inspection required by 6.5.1.6.4. However, an IBC filled prior to the date of expiry of the last periodic test or inspection may be transported for a period not to exceed three months beyond the date of expiry of the last periodic test or inspection. In addition, an IBC may be transported after the date of expiry of the last periodic test or inspection.

(a) After emptying but before cleaning, for purposes of performing the required test or inspection prior to refilling; and

(b) Unless otherwise approved by the competent authority, for a period not to exceed six months beyond the date of expiry of the last periodic test or inspection in order to allow the return of dangerous goods or residues for proper disposal or recycling. Reference to this exemption shall be entered in the transport document.

[Formerly 4.1.2.10]

Delete sub-heading "4.1.2.11 Additional general provisions for the use of rigid plastics and composite IBCs for liquids".

4.1.2.3 For rigid plastics IBCs and composite IBCs with plastics inner receptacles, unless otherwise approved by the competent authority, the period of use permitted for the transport of dangerous liquids shall be five years from the date of manufacture of the receptacle except where a shorter period of use is prescribed because of the nature of the liquid to be transported.

[Formerly 4.1.2.11.1]

4.1.2.11.2 to 4.1.1.10

4.1.2.4 IBCs of type 31HZ2 shall be filled to at least 80% of the volume of the outer casing and always be carried in closed transport units.

[Formerly 4.1.2.11.3 and 4.1.2.11.4].

Consequentials

4.1.3.5 Amend to read:

Packagings, including IBCs and large packagings, shall conform to the requirements of Chapter 6.1, 6.5 or 6.6, respectively, and shall meet the test requirements of 6.1.5, 6.5.4 or 6.6.5, respectively, for packing group II, subject to 4.1.1.13, 6.1.2.4 and 6.5.1.4.4. Packagings meeting the test criteria of packing group I may be used. To avoid unnecessary confinement metal packagings of packing group I shall not be used.

6.5.3.1.1 (c) delete second sentence [now in 4.1.1.10].

6.5.3.1.7 refers to 4.1.3.2 - Should be 4.1.1.4

6.5.4.8.4.2 refers to 4.1.2.2. - Should be 4.1.1.4